

Cobb's Wren *Troglodytes (aedon) cobbi* of the Falkland Islands

by R. W. Woods

Received 2 November 1992

The single Falkland Islands species in the genus *Troglodytes* was described at the 153rd meeting of the British Ornithologists' Club on 20 October 1909. Mr Charles Chubb communicated, through Dr R. Bowdler Sharpe, a description "of a new species of Wren from the Falkland Islands, where it had been discovered by Mr A. F. Cobb". Chubb (1909) named this wren *Troglodytes cobbi*, and his description reads as follows:

TROGLODYTES COBBI, sp. n.

Similis *T. hornensi*, sed valde major: supra cinerascenti-brunneus, gutture et pectore toto cinerascenti-isabellinis. Long. tot. c.5.4 poll., culm. 0.85, alae 2.8, caudae 1.75, tarsi 0.75. *Obs.* In *T. hornensis*, Less., the bill is only 0.6 inch and the tarsus 0.7, so that *T. cobbi* seems to be a large insular form.

There are no further comments on the species in this issue of the *Bulletin*, and Cobb did not include this wren in either of his two short books on Falklands wildlife and birds (1910, 1933).

Since its discovery, Cobb's Wren has been treated as a species only by Chapman & Griscom (1924), Bennett (1926), Chapman (1934) and Bennett (1935). In discussing its affinities, Chapman & Griscom used specimens collected in 1915-16 by R. H. Beck. They concluded that it was obviously a representative house wren but was sharply distinct from continental races because it was almost as dark below as above, was noticeably large, and occupied an insular habitat. They felt that it deserved specific rank, and Chapman (1934) reiterated this opinion when he stated that *T. cobbi* was "A specifically distinct representative of the continental *Troglodytes musculus*". Hellmayr (1921), however, although he had not seen any skins of Cobb's Wren, treated it as a subspecies of the mainland *T. musculus* (later usually merged with North American *T. aedon*), and this has been accepted by most later authors. Later, after examining the AMNH skins of Cobb's Wren, Hellmayr (1934) stated that they were nearest in colour to *T. m. bonariae* of eastern Argentina, Uruguay and extreme southern Brazil, rather than the geographically nearest race in southern Argentina and Chile, *T. m. chilensis*, in which he included *T. m. magellanicus*. He noted that the "Falkland Wren" was very much larger with a much stronger, longer bill and had no buff postocular streak, yet he maintained his original classification of it as a race of *T. musculus*.

Dimensions of Cobb's Wren

The measurements of live-trapped Cobb's Wrens, presented in Table 1, were obtained during field work on Kidney Island (51°38'S,

TABLE 1
Measurements (mm) of Cobb's Wrens ringed on Kidney,
Bleaker or George Islands between 21 November 1959 and
16 March 1963

	<i>n</i>	Range	Mean	s.d.
Wing	19	52-63	56.2	3.17
Bill	18	13-20	17.9	1.77
Tarsus	16	15.5-20	17.9	1.29
Tail	2	41-42	41.5	0.71
Body length	5	130-140	134	3
Weights (g)	7	17-20	19.1	1.02

Bill length was taken from the side with dividers pressed along the culmen to the skull.

57°44'W) 11 km (7 miles) northeast of Stanley, East Falkland, between November 1959 and March 1963, and from R. Reid (*in litt.*) who trapped, ringed and measured several specimens on George Island (52°21'S, 59°45'W) and Bleaker Island (52°12'S, 58°51'W) in 1961. Chapman & Griscom's (1924) measurements fall within the ranges shown in Table 1, except for their tail-lengths which have a range of 39-43 mm. Hellmayr (1934) gives similar dimensions for the same skins, though bill lengths are about 2 mm longer and closer to the mean of the 1959-63 sample. Chubb's (1909) measurements of the type, converted to mm, are all greater than the 1959-63 means; wing (71 mm), bill (21.6 mm) and tail (44.5 mm) fall outside the ranges shown in Table 1; tarsus and body length measurements fall within the range. The Chubb type specimen (1909. 10. 20. 37) and the three other Falkland skins at the Sub-Department of Ornithology, Tring, were measured in February 1991. All four specimens have very similar dimensions (wing 55-59 mm, tail 43.2-45.5 mm, bill 17-19 mm, tarsus 17-19 mm). Except for the tail, they fall within the ranges of the 1959-63 sample. It appears that measuring techniques used in 1909 differed from those used now or that there were errors in the figures given by Chubb.

Plumage aberrations

Cawkell & Hamilton (1961) recorded the first example, a cream-coloured bird seen several times on Kidney Island in 1951. On 16 March 1963, a partial albino Cobb's Wren was trapped and photographed on Kidney Island. This bird had symmetrical rectangular white flank patches and one white lesser wing-covert on the right wing. The underparts were paler than usual, with a creamy white throat, buffish breast and chestnut vent and undertail-coverts. A bird with similar pale flanks was seen 500 m away on the other side of Kidney Island in October 1962. Several birds showing variable white or grey markings near the eyes and on the crown were seen and photographed on Kidney Island between 1959 and 1962 on dates

between 26 October and 3 January. Spread over this period of the breeding season, these markings seem unlikely to be head moult and no sequence over the head was found. No birds with unusual plumage colours were seen on Kidney Island in 1983, but one singing male on Carcass Island in 1983 was recognisable because it showed partial albinism in plumage and claws. The albinism was symmetrical in three white inner secondary feathers on each wing, separated by one normal feather, and there were several other white body and head feathers. These aberrations have probably arisen through mutation in the restricted gene pools, in the small isolated island populations of Carcass and Kidney which are 190 km (120 miles) apart. As mentioned later, there is no evidence of regular migration between offshore islands.

Distribution, habitats and nesting of the House Wren in the Americas

This summary is intended to provide a basis for comparison with the distributional and ecological data on Cobb's Wren given in the subsequent sections.

The House Wren is widespread in North and South America and migratory in the southern and northern parts of its range (Kendeigh 1941, Humphrey *et al.* 1970, Venegas & Jory 1979). Ridgely & Tudor (1989) describe it as a virtual commensal of man almost throughout South America. Crawshay (1907) remarks that it is one of the commonest birds in the outskirts of forests in Tierra del Fuego. The House Wren's adaptability was noted by Hudson (1920) and confirmed by Ridgely & Tudor who state that it occurs "in virtually all open or semiopen habitats." Although Crawshay did not find it in open grassland, Venegas & Jory (1979) observed it in many habitats throughout the Magellanic region, including treeless uplands to 1000 m. South of Tierra del Fuego, Reynolds (1935) observed House Wrens in stunted evergreen woodland on islands of the Wollaston group. Observers in the Americas agree that it will nest in any available hole of a suitable size, above or below ground level. Nests are untidy deep cups with a foundation of coarse sticks that almost fill the chosen site. The cup is lined with fine grasses and roots with an inner lining of soft materials (Hudson 1920, Haverschmidt 1952, Skutch 1953).

Historical records of Cobb's Wren

There are no definite records of Cobb's Wren in the early years of settlement before the species was described. Only Pernety at Port Louis in 1764 and Clayton on Saunders Island between 1773 and 1774, provide evidence of the presence of some kind of wren.

Pernety (1771) remarked on the "great numbers of wrens like those in France". Cobb's Wren resembles the European Wren *T. troglodytes* while the Grass (Short-billed Marsh) Wren *Cistothorus platensis* has generally lighter plumage, heavily striated buff and black above. Pernety's brief comment may be significant because he was describing part of East Falkland when the native vegetation was intact. Pernety and the other French settlers established Port Louis in 1764 and

introduced the first herbivorous animals, including cattle, sheep, pigs and horses. These grazed and trampled the coastal tussac grass *Parodiochloa flabellata*, a gigantic and very long-lived plant that has evolved only in south Atlantic regions with few or no native herbivores (Wace 1960). Tussac cannot survive continuous grazing and is also very susceptible to fire (Bourne 1988, Woods 1988). Since the late 18th century, almost all tussac on East and West Falkland has disappeared but it survives on some smaller offshore islands where it has not been over-grazed or burnt. A recent study showed a 42% decrease in mature tussac on 22 continuously stocked islands between 1956 and 1983 (Woods, in Strange *et al.* 1988).

Clayton (1774) on Saunders Island noted "two kind of little birds whose plumage is light brown, one with a white throat and fond of coming in and about our houses like the Robins in England". His "little birds" may have been compared with the large, conspicuous sheldgeese *Chloephaga* spp. and therefore could apply to any passerines, though other brief descriptions refer to "finches" and a "thrush". Possible species for these "little birds" are the wrens and the Tussac-bird *Cinclodes antarcticus*. The Grass Wren does not frequent habitations. Cobb's Wren is predominantly brown above with buffish underparts, darker at the sides and whitish in the centre, and is fairly tame. The remarkably tame Tussac-bird is a dull dark brown. Though Clayton's descriptions are inadequate, he may have been referring to Cobb's Wren and the Tussac-bird.

None of the visiting naturalists in the 19th Century (Quoy and Gaimard in 1820, Garnot in 1822, Darwin in 1833 and 1834, Hooker and McCormick in 1842 and Abbott between 1858 and 1860) reported a wren that is recognisable as Cobb's Wren. This seems surprising because Cobb's Wren is tamer, has a louder song and is more easily seen where both species occur. However, Abbott apparently only travelled in East Falkland while Quoy and Gaimard, Garnot, Darwin and McCormick were all based for periods of one to six months in the Berkeley Sound/Port Louis area of East Falkland. Garnot and Abbott both noted the Grass Wren which still occurs in marshy areas with rushes on the main islands. Their failure to record Cobb's Wren was possibly associated with deterioration of habitat. When Quoy and Gaimard stayed for several months in 1820, most tussac had probably disappeared from the Port Louis area with consequent loss of habitat for all passerines. Some evidence comes from the botanist J. D. Hooker (1847), who visited Port Louis in 1842, nearly 80 years after the first settlement. He remarked that cattle ate the tussac straw used to roof a house in the settlement, estimated that about 30,000 feral cattle roamed the country, and commented that tussac had been greatly reduced by uncontrolled grazing. Perhaps none of these naturalists visited offshore tussac-covered islands, such as Kidney Island in the southern entrance of Berkeley Sound, where a strong population of Cobb's Wren still exists. There is no evidence that it occurred in coastal regions of East Falkland, but if it did, the widespread destruction of tussac may have contributed to its disappearance before 1820.

TABLE 2
Occurrence of Cobb's Wren and mammalian predators on 29
outer islands of the Falkland Islands

	Number of predator species			
	0	1	2	3
Cobb's Wren present	16	1	0	0
Cobb's Wren absent	0	3	7	2

Distribution and status of Cobb's Wren

Cobb's Wren is resident in the Falkland Islands and appears to be sedentary. Pettingill (1960) concluded that the prevailing strong westerly winds and equable climate would tend to inhibit migration, particularly of the land birds living in tussac. Winters are not so severe as to favour migration though the predominant westerly winds possibly aided colonisation in the past. Evidence of sedentary behaviour was obtained by ringing between 1959 and 1963. Of the 23 ringed, the five subsequent records, up to 11 months after ringing, were all of birds seen or retrapped on the island where ringed. Neither ringing nor the few records of post-breeding dispersal have suggested interchange between the isolated island colonies. There is, however, evidence of post-breeding dispersal from Carcass Island to nearby West Point Island, where R. B. Napier (*in litt.*) has seen a few individuals in autumn.

In 1983 a Breeding Birds Survey was started through the Falkland Islands Trust in Stanley, now Falklands Conservation (Woods 1989). By 1993, Cobb's Wren had been recorded as present or breeding on only 17 offshore islands and as absent from 12 islands (Fig. 1). The data are summarised in Table 2 in relation to the number of predator species. Domestic or feral cats *Felis catus* and Norway Rats *Rattus norvegicus* were recorded on seven islands, Black rats *Rattus rattus* on one island, House Mice *Mus musculus* and Patagonian Foxes *Dusicyon griseus* each on four islands. Cats or foxes were present on 10 of the 12 islands without Cobb's Wren and both were present on one of the 10, suggesting that introduced carnivores are potentially more damaging than the omnivorous rodents. It has, however, been reported as breeding on one island where there are a few domestic cats but no rats or mice.

Habitat

Beck (1917) found that Cobb's Wren was still common on Kidney Island but saw none around Stanley and he remarked that the destruction of tussac grass by sheep on all but outlying islets had driven "the wren" away from inhabited areas. Bennett (1926) and Cawkell & Hamilton (1961) implied that it occurred exclusively on tussac islands. Pettingill (1974) described it as a "common resident on certain tussock islands where it frequents the adjacent beaches, rocky slopes and cliffs". He was puzzled in 1953-54 and 1971-72 by the restricted distribution of



Figure 1. Islands where Cobb's Wren was present or absent during the Breeding Birds Survey of Falklands Conservation 1983–1993. *Cobb's Wren present*: a, North Fur; b, Flat Jason; c, Elephant Jason; d, South Jason; e, South Fur; f, Carcass; g, Low; h, Dunbar; j, Third Passage; k, Beef; m, Speedwell; n, George; p, Barren; r, Sea Lion; s, Beauchêne; t, Kidney; u, Lively. *Cobb's Wren absent*: 1, Steeple Jason; 2, West Point; 3, Split; 4, Saunders; 5, Keppel; 6, Pebble; 7, New; 8, Beaver; 9, Staats; 10, Weddell; 11, Bleaker; 12, East.

Cobb's Wren; his observations suggested that it required extensive and luxuriant tussac on small islands and he did not see it in any other kind of habitat. He had no knowledge of its occurrence in Stanley or at farm settlements, "despite the prevalence of tree and shrub plantations, many hedgerows [of gorse and native *Box Hebe elliptica*] and numerous cavities in sheds and dilapidated buildings". Evidence from the Breeding Birds Survey confirms that Cobb's Wren does not utilise the variety of habitats that are exploited by the House Wren in South America. The lack of substantiated records from the mainland of East or West Falkland suggests that it cannot survive where coastal tussac grass and shrubs such as *Fachine Chiliotrichum diffusum* have been destroyed and where feral cats, rats and mice are present. However, field work on Carcass Island showed that tussac grass is not an essential component of all territories.

Nest-sites and nests

Most of the few recorded nest-sites have been in basal parts of large tussac plants. Cawkell & Hamilton (1961) reported one nest hidden

beneath large boulders on Kidney Island and a nest was found in a sheepskin hanging on a fence on George Island (Reid, in Woods 1975). There is no evidence that Cobb's Wren now nests in any shrubs or in sites such as stone walls or sheds. Five nests on Kidney Island and Carcass Island were built of dead tussac stems with substantial linings of soft feathers. Each nest filled a hollow, either between dead leaves near ground level or within a crack in the fibrous root pedestal. Two of three nests examined were domed, with an entrance hole near the top. Pettingill (1974) notes that the nest he found on Kidney Island was a ball of dead grasses in a hollow on the side of a pedestal, 90 cm above ground.

On Kidney Island in October 1962, a deep cup-shaped nest with four small chicks was found in a cavity at the side of a tussac root pedestal. The nest was about 60 cm above ground and sheltered by overhanging dead leaves. On 30 October 1962 it was lined with large soft, white and barred Kelp Goose *Chloephaga hybrida* feathers. When dismantled in January 1963, these Kelp Goose feathers were absent, possibly removed by other birds for use in their nests. The main structure was of dry grasses up to 20 cm long, with a few to 33 cm, woven in a circle and intermixed with root fibres. The lining consisted of 255 feathers from at least seven species and about 100 hairs of the Southern Sea Lion *Otaria byronia*. Feathers that could be identified included Grey-backed Storm-Petrel *Garrodia nereis* (171), Turkey Vulture *Cathartes aura* (31), Falkland Thrush (19), Short-eared Owl *Asio flammeus* (11) and Diving Petrel *Pelecanoides* sp. (2). The remaining 23 feathers could not be identified, except two of a penguin species and one probably from the Black-crowned Night Heron *Nycticorax nycticorax*. No Tussac-bird feathers were found, which was surprising because it is the commonest passerine on Kidney Island (Woods 1970).

On Carcass Island, a nest with nearly fledged young was found on 29 October 1983. It was at ground level by the base of a large tussac plant within a crack between dead stems. This nest was domed, with a large entrance, about 8 cm wide, in the top half. Another domed nest discovered on 1 November 1983 was in a similar site but was about 40 cm above ground with an entrance hole about 6 cm wide.

Field work on population densities in 1983

Information on habitats and territory size was obtained during passerine census work in tussac grass on Kidney Island (32 ha), West Point Island (51°20'S, 60°41'W, 1255 ha) and Carcass Island (51°18'S, 60°32'W, 1894 ha) during the southern spring of 1983 (Woods 1984).

West Point Island

The census plot (5.3 ha) looked similar to that on Carcass Island (4.2 ha, Fig. 2), with mature tussac grass replanted over 80 years earlier, interspersed with low grasses on a coastal slope. The tussac was suitable for nesting but Cobb's Wren was absent. The owner of West Point Island, R. Napier, told me in 1961 that he believed Cobb's Wren did not nest on the island. An important difference between the two

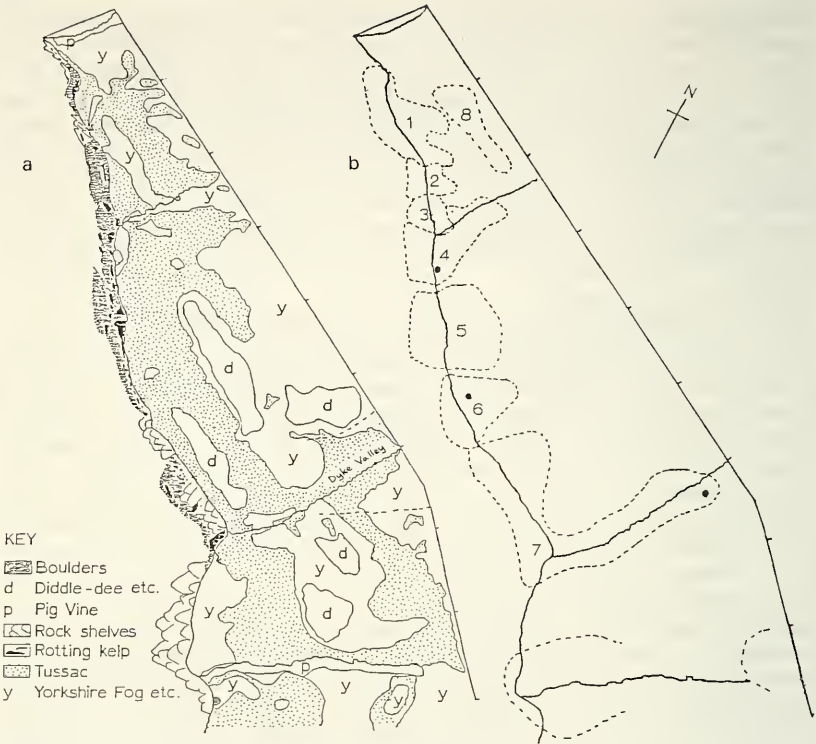


Figure 2. (a) Distribution of major vegetation types in the northern part of Dyke Paddock, Carcass Island, West Falkland; October 1983. (b) Outlines of Cobb's Wren territories in the same area. Nest-sites are shown in territories 4, 6 and 7. 50-m intervals are marked on the right-hand boundary.

islands (only 9 km apart) was the presence on West Point of feral cats, Norway Rats and House Mice. Carcass Island has remained free of rats and mice by chance, while successive owners have not kept more than one domestic cat. In the 1950s West Point Island was infested with rats but by 1961 there were few rats and many cats. In 1983, independent estimates of the number of feral cats by the four residents ranged from 20 to 50. Further evidence that cats reduce populations of passerines came from G. Bound (*in litt.*) in November 1985. He reported that on Bleaker Island, south of East Falkland, cats were absent for many years and wrens were then very common. During recent visits no wrens and few other small birds were seen, especially around the house. He also reported three domestic cats and the presence of rats.

Carcass Island

Figure 2a shows the main vegetation types in the Dyke Paddock census plot, where much of the shoreline had dense tussac to highwater

mark. Figure 2b shows the territories drawn after 43 hours mapping of individuals over a period of 16 days. Of the eight passerine species recorded in the census plot, Cobb's Wren was second only to the Tussac-bird in the total number of records. Many simultaneous observations were made when a singing male stimulated adjacent males to sing. Several flight chases and some confrontations on the shore were also registered. Seven of the eight territories included a section of shore. One male (no. 8) sang quietly from a tussac strip up the slope behind other territories, perhaps because it was unmated or unable to defend a shore section. The nest in the largest territory (no. 7) was only 20 m from the boundary fence but this male was recorded over the 100 m to the shore and about 100 m along the shoreline. In contrast, the smallest territory included only 15 m of shoreline.

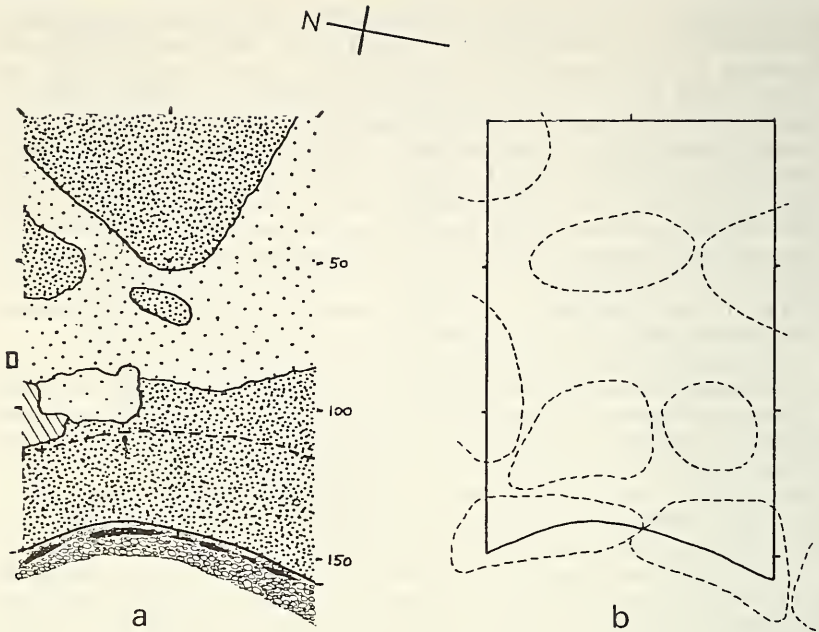
Comparison of Figures 2a and 2b shows that Cobb's Wren territories were smallest where tussac bordered a boulder beach with rotting kelp. This concentration occurred in the northwestern half where six males defended adjacent strips between 15 and 60 m long (average 35 m). There were fewer boulders at the northwestern end and 12 m of territory no. 1 included flat shelf rock below the tussac. Territories 6 and 7 met 10 m into a 30 m strip of flat rock. Territory 7 had only 40 m of the 100 m shoreline covered by boulders.

Only about one-third of the tussac in the plot was included in these territories though all shoreline tussac was within a defended territory. The two smallest territories (2 and 3) each had about half their area on a wider section of boulder beach with thick kelp. The two males often sang from boulders or dead tussac pedestals that had fallen on the beach. Territory 4 had a similar beach area but the tussac was mostly separated from the shore by some dense lyme-grass *Elymus arenarius*. This territory also extended 50 m up the narrow valley of a stream.

The difference in population density of Cobb's Wren between the census plot in a fenced tussac paddock and the sparsely vegetated 1.6 km of shoreline between the paddock and the settlement was striking. The shoreline was walked on the fine, nearly calm morning of 25 October 1983. Records were made of every singing Cobb's Wren located and the distance each bird moved along the shoreline after being flushed or stimulated into song by a tape-recording played briefly. Assessed in this way, there were six territories, and one isolated record. Territory sizes varied between 40 and 205 m of shore (average 93 m), separated by undefended lengths varying from *c.* 60 to *c.* 180 m (average 122 m). The shoreline varies from gentle slopes to cliffs up to 10 m high at the ends of ridges in the undulating ground. In places flat rocks project from the shore and there are several small bays below cliffs, with boulders and kelp. The vegetation along this shoreline consisted of short turf grazed by geese and sheep, dense patches of diddle-dee *Empetrum rubrum* on the ridges, eroded bare ground on slopes and rushes *Rostkovia magellanica* in hollows; there was no tussac.

Kidney Island

This is a prime example of an ungrazed offshore tussac island, though tussac was cut until the 1940s for livestock in Stanley (Woods



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







-  Dense tussac, 1.5-2.5m high
-  Tussac 1-1.5m, dense with small clearings
-  Cinnamon grass, Small fern, dead tussac stools
-  Cinnamon grass & Wild celery
-  Boulders & rotting kelp
-  Break in slope: 4° to E, 10-30° to W
-  Spring
-  Hut

Figure 3. Distribution of major vegetation types in the census plot on Kidney Island, East Falkland; September 1983. (b) Outline of Cobb's Wren territories in the same area.

1970). In 1963 almost all the island was covered in tussac 1.5 to 2.5 m high and in 1983 the tussac was, if anything, more dense. The census plot was small (1.45 ha), due to difficulties in marking and using a 50 m grid in tussac reaching well above head height. Seven census visits were made, and territories were assessed by the method used in the B.T.O.'s Common Birds Census.

At least six territory-holding male Cobb's Wrens were found in the census plot (Fig. 3), where some occupied tussac 100 m or more from

the shore and others used the beach for feeding and singing. Of the four territories occupying the coastal half of the plot, two extended along the shoreline and two were completely within dense tussac on the slope. Territories away from the shore seemed more widely scattered, perhaps because larger feeding areas were needed where the birds had no access to the beach. The population density of Cobb's Wren in the Kidney Island plot was similar to that in the northwestern section of the Carcass Island plot.

In September, passerine activity was recorded in three visits along 400 m of the shoreline, from the eastern corner of the census plot. The spread of registrations suggests that seven individuals held territories, with an average of *c.* 57 m of shoreline each, slightly longer than the average (45 m) found in the Carcass Island plot. The tussac cover around the Kidney Island bay was complete, whereas Cobb's Wrens on Carcass Island were competing for a very limited area of mature tussac with only patchy growth extending away from the shore. The 400 m of the shoreline consisted of boulders and dead kelp adjoining the tussac edge, with larger quantities of kelp over the 150 m at the eastern end.

Conclusions

Cobb's Wren is noticeably tolerant of humans, but, in contrast to the continental House Wren, it is rarely found close to settlements. Known populations of this resident and sedentary species are concentrated in mature tussac grass, probably because it offers excellent shelter from strong winds, provides potential nest-sites and materials and supports a larger invertebrate fauna than other Falkland habitats. Where tussac on a slope is adjacent to a boulder beach with accumulated dead kelp, conditions are further improved because the tussac is more vigorous and the potential food supply is increased by littoral invertebrates.

Cobb's Wren occurs up to 1.6 km (1 mile) from coastal tussac where the island is free of introduced mammalian predators. Its current distribution is closely related to the presence or absence of predators, particularly domestic and feral cats. Susceptibility to predation may have been increased by the shortage of dense cover during the destruction of tussac over the past two centuries. Poor agricultural management with widespread over-grazing and the burning of other inland grasses and low shrubs, in attempts to increase the availability of new growth as forage for sheep (Bourne 1988), have further depleted the available habitat and probably contributed to the isolation of Cobb's Wren populations on a few outer islands. These isolated colonies have produced examples of plumage aberration, particularly on Kidney Island at the eastern side of the archipelago.

The larger size, longer bill and wing of Cobb's Wren, and the marked ecological differences between it and the House Wren in the Americas, strengthen the case for treating it as a separate species, *T. cobbi*. It is vulnerable because it is almost exclusively found on tussac islands without introduced predators. Conservation measures with careful monitoring may be necessary if it is to survive.

Acknowledgements

I am grateful to my employers, Devon County Council, for allowing leave of absence for the 1983 field work. I thank the Royal Society of London for a generous grant and the National Geographic Society (Grant 2712-83), the Falkland Islands Foundation and the British Ornithologists' Union for financial support. Several people helped with the 1983 visit; Sir Rex Hunt the Civil Commissioner, Colonel Ian G. Nason, then Chief of Staff at British Forces Falkland Islands, Roddy and Lily Napier of West Point Island, Robin and Lorraine McGill of Carcass Island, Stan and Susan da Prato, John Sherwood, Kitty and the late Cecil Bertrand. I thank all the observers who submitted records for the Breeding Birds Survey. I am grateful to Dr Linda Birch at the Edward Grey Institute, Oxford, for offprints and to the Natural History Museum at Tring for access to skins and for offprints. My thanks are due to Dr David Snow for his invaluable advice on earlier drafts.

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Re-evaluation of the taxonomic status of *Phylloscopus subaffinis arcanus*

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Received 15 September 1992

The description of *Phylloscopus subaffinis arcanus* Ripley (1950) was based on three specimens collected in Nepal in the non-breeding season. This was considered to be a significant extension (c. 1200 km) of the known range of *P. subaffinis*, the nominate race of which breeds in central and southeastern China and winters in southern China and neighbouring parts of Burma, Thailand and Indochina (King *et al.* 1975, Watson 1986, Cheng 1987, Lekagul & Round 1991). The alleged intermediate appearance of *arcanus* between *P. affinis* and *P. subaffinis* has been used as evidence of intergradation and to support the view that *P. affinis* and *P. subaffinis* are conspecific (Williamson 1967, Watson 1986). However, while Vaurie (1954, 1959) recognized *arcanus* as a subspecies of *P. subaffinis*, he wrote that “its validity and status require further study”.